

October 30, 2008 LM-80 Webinar Attendee Questions

1. Q: Has this standard been issued to all the testing labs for utilization?
A: The standard is now available from the IESNA on the IES website for everyone.
iesna.org
2. Q: Will submissions by the testing labs for the manufacturers be acceptable?
A: Yes, for the foreseeable future ENERGY STAR will allow LED device manufacturers to provide LM-80 data.
3. Q: Is it percentage of MAXIMUM or STARTING output?
A: We assume you are referring to L70, in which case it is starting or initial light output.
4. Q: How exactly is case temperature defined? Depending on the package construction, the measured temperature near a package could vary significantly for a specified junction temperature.
A: LM-80 defines case temperature (T_s) as the temperature of the thermocouple attachment point on the LED light source package as defined by the manufacturer of the package.
5. Q: The Arrhenius Method has been used for LED lifetime extrapolation in the past. Is this being looked at now as an option or has this been discarded?
A: Nothing has been discarded and we are in the process of looking at a variety of methods to estimate long term modeling and predication. The Arrhenius methods are a commonly used means to determine the reliability of electronics.
6. Q: Are the temperatures 55 and 85C, ambient, pin, board temp, or junction temp? and why was 55 and 85C chosen?
A: Case temperature. The temperatures were chosen to reflect commonly used values in LED specifications. The third temperature is left open for the manufacturer to select in accordance with their recommended operating conditions.
7. Q: You mentioned LM-80 was a component level test, then showed complete fixtures setup in an application (wall/ceiling). Does this test pass only the LED(s) in the fixture/module or the complete product?
A: LM-80 provides lumen maintenance for LED packages, modules and arrays at three temperatures. In order to apply LM-80 results to the luminaire we must measure the LEDs when installed in the luminaire and operated in conditions that simulate how the luminaire will be installed in the field (UL 1598).
8. Q: What is the definition of excessive vibration? What would be similar to a ceiling fan?
A: We purposely avoided a particular value. A ceiling fan seems unrelated to this testing unless the vibration from a nearby fan can be felt in testing. No fan would be used near the test unit however due to airflow.
9. Q: Apologies. I couldn't join at the start. Will the Webinar be available for re-broadcast via the web?
A: No, but the presentations will be posted.
10. Q: 4.4 Temperatures - it says "Case" temperatures. Modules won't have cases. Do you mean T_b/T_c point temperatures, T_j temperatures or Ambient temperatures?
A: Modules will still have LEDs and the case of an LED can be used.

11. Q: Wouldn't you need a PCB to test any given LED since this way the Tc can be monitored? This would take additional time.
A: LEDs could be mounted directly to a heatsink or a PCB, so the case temperature could be taken whether the LEDs are mounted to a PCB or a heat sink.
12. Q: what if it is not physically possible to raise the temperature of the LED or a bunch of LEDs in a cluster?
A: The ambient temperature would insure raised temperatures.
13. Q: What about products that employ fans?
A: Fans are currently not prohibited in ENERGY STAR however DOE sees active cooling as undesirable for long-term LED success.
14. Q: Where will the LM80 documents be posted?
A: LM-80 is now available on the IES Web site: <https://www.ies.org/shop/> those interested in obtaining a copy should search by the product ID and type in LM-80-08 in the search field. The cost is \$25 plus shipping.
15. Q: For photometry measurement, we need to send our samples every time to certified LM-79 lab?
A: We assume you are referring to the ENERGY STAR requirement for measuring flux, efficacy, etc. DOE has adopted a "product family" approach that allows one test to represent multiple luminaires provided certain conditions are met. Check the ENERGY STAR Manufacturer's Guide for the conditions.
http://www.netl.doe.gov/ssl/PDFs/ENERGYSTAR_Manufacturers_Guide_30Sept08.pdf
16. Q: We have our own Integrating sphere measuring apparatus; does that mean my LED cannot meet with LM-80, because my instruments are not LM-79 certified?
A: We're not quite sure what your question is. LM-80 is testing done by the LED device manufacturer for lumen maintenance and LM-79 is photometric measurement of LED luminaires (complete systems). ENERGY STAR will only accept LM-79 testing from a DOE-approved test lab. To find a list of participating approved labs visit http://www.netl.doe.gov/ssl/comm_testing-labs.htm.
17. Q: In Assist Recommends..., it told us to ignore the first 1,000 hours (as referred to Seasoning Period), do LM-80 ignore the first 1,000 hours?
A: No, LM-80 includes the first 1000 hours to track the change in output. This effect is not seen in all LED systems so for future modeling we will need to see this data as well.
18. Q: From Lumileds, they define not only L70, but also a B10 or B50 factor for the population of test samples; does LM-80 cover this?
A: No. B-series is a reliability measure, but the exact measure by that manufacturer is not revealed and this is not part of LM-80. It is likely that a measure of reliability will someday be included however.
19. Q: Have you tried this procedure? What difficulties have you encountered?
A: LED manufacturers have been testing LEDs in procedures very similar to LM-80 for the past couple of years, No endemic difficulties have been encountered.
20. Q: Why are the LM-80 lumen depreciation requirements different between residential versus commercial?
A: LM-80 is simply the method for measuring lumen maintenance for solid-state lighting devices. What you are asking is why is the requirement for residential indoor 25,000 hours and residential outdoor and all commercial 35,000 hours. The answer is simply operating hours. ENERGY STAR uses 3-4 hour per day operation for residential indoor

whereas commercial and outdoor is typically 12 hours per day so ENERGY STAR chose to require a longer minimum lifetime for commercial and outdoor products.

21. Q: Is it the UL8750 for LEDs?

A: Yes, it will be. It is not a listing standard yet.

22. Q: Is L70 based on "maximum light output" or "initial light output"?

A: L70 is based on initial light output.

23. Q: When should we expect to hear some of the first LM-80 test reports (did some manufacturers get the jump on this testing by guessing the final criteria correctly)?

A: Most of the major LED manufacturers have been collecting LM-80 data for quite some time. There may be a few instances where the manufacturer does not have the two required temperatures and one manufacturer selected temperature but this does not pose a problem in the near term.

24. Q: Since TM-21 doesn't exist yet, what was the rationale for 91.8% or 94.1% representing a 50,000 hours (or whatever) L70?

A: The selection of 91.8 and 94.1% lumen maintenance at 6000 hours corresponds to solving the exponential equation for 25,000 and 35,000 hours, respectively. It is an inherently conservative approach that ensures at least the required L70 performance for ENERGY STAR. In the future when there is an industry standard methodology for applying projective curves to LM-80 data, DOE will consider incorporation into ENERGY STAR.

25. Q: What is the process for situations where a manufacturer's data is challenged (a 3rd party disputes the data)?

A: DOE will be launching a quality assurance program first quarter 2009 and will address this concern as part of that process.

26. Q: I apologize...where is Kevin from again?

A: Kevin Dowling is the VP of Philips/Color Kinetics

27. Q: Who is ultimately responsible for LM-80 testing? The LED manufacture or the end user such as a lighting manufacture?

A: The LED manufacturer, not the luminaire manufacturer.

28. Q: Does UL Standard 8750 come into play? UL 8750 is the new standard for LED's.

A: UL listing standards are only for safety related issues, specifically shock and fire hazard. LEDs are not typically listed, but with driver circuitry or line voltage conditions can be UL recognized or UL listed. LM-80 and UL8750 have nothing to do with each other.

29. Q: What to do if the product maximum temp is 80 C?

A: We're not quite sure of the context for this question. If an LED device, package or array is designed to provide acceptable lumen maintenance at 80°C and is properly heat-sinked, then there should be no problem.

30. Q: Has DOE thought about some sort of policing or checking the accuracy of manufacturer delivered LM-80 data?

A: Yes. In the future DOE may require independent third-party laboratories to test for LM-80. In the near-term, device manufacturers are in the best position to conduct testing.

31. Q: When will the actual LM-80 document be available to public? Currently it's apparently not available.

A: LM-80 is now available on the IES Web site: <https://www.ies.org/shop/> those

interested in obtaining a copy should search by the product ID and type in LM-80-08 in the search field. The cost is \$25 plus shipping.

32. Q: Is a drive current (like binning current for the LED) recommended?

A: LED manufacturers typically will state the maximum drive temperature for their products. But realize that there is a trade-off between light output and lumen maintenance and therefore it is up to the fixture manufacturer to design a system based upon the product's objectives.

33. Q: When will LM-80 be on the web?

A: LM-80 is now available on the IES Web site: <https://www.ies.org/shop/> those interested in obtaining a copy should search by the product ID and type in LM-80-08 in the search field. The cost is \$25 plus shipping.

34. Q: How come the LED graphs only go to 6000 hours? Are there any curves available up to 30K, 40K hours or higher?

A: The examples in the presentation showed 6-7000 hours which is ~ 9 months. 6000 hours is the minimum necessary for LM-80. The technology is changing so fast that there simply is not enough time to test for longer periods of time. 30K hours is 3.5 years and manufacturers will have developed several generations of new chips in that timeframe.

35. Q: How soon can we expect all LED manufacturers to be able to provide the LM-80 data?

A: Most of the major LED manufacturers have the necessary data to generate the LM-80 report. In the event that they do not, at least 6,000 hours (8.3 months) of testing will be necessary.